IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of: Sanderson	]	Art Unit: 1762
Serial No. 09/744,420	]	Examiner: K. Stouffer
Filed: March 6, 2001	]	Confirmation no: 5624
For: PROCESS FOR COATING GLASS	]	Attorney Docket: 1-15240

June 5, 2007

MAIL STOP APPEAL BRIEF – PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

BRIEF ON APPEAL

Honorable Sir:

This brief is in furtherance of the Notice of Appeal, which was timely filed in connection with the above-captioned application on October 12, 2006. This Brief is being filed under the provisions of 37 CFR §41.37 and its related requirements. The fees required under 37 CFR 1.17(F) are submitted herewith.

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1. Real Party in Interest

The real party in interest is Pilkington Group Limited, which is a wholly owned subsidiary of Nippon Sheet Glass Limited of Japan.

2. Related Appeals and Interferences

There is no known appeal or interference which will directly affect, or be directly affected by, or have a bearing on, the Board's decision in this Appeal.

3. Status of Claims

On December 14, 2005, applicant submitted a Notice of Appeal in connection with the subject application, appealing the final rejection of claims 1-12.

The status of each of the claims is as follows:

1. Claims cancelled: 5, 23-33;
2. Claims withdrawn from consideration but not cancelled: None;
3. Claims pending: 1-4, 6-22 and 34-44;
4. Claims allowed: None;
5. Claims rejected: 1-4, 6-22 and 34-44.

The claims on appeal are 1-4, 6-22 and 34-44. A copy of the claims on file is submitted in the attached Claims Appendix.

4. Status of Amendments

No amendment was filed subsequent to the final rejection of the application by the Office Action of July 12, 2006.

5. Summary of Claimed Subject Matter

The present invention, as defined by independent claim 1, defines a chemical vapor deposition process for depositing a coating comprising tungsten oxide in an on-line float glass production process on the surface of a glass substrate to produce a solar control glass which transmits a high percentage of incident light. The process comprises directing a gaseous stream comprising tungsten oxyhalide or tungsten chloride and a source of oxygen on to the surface of the glass substrate. The source of oxygen comprises an ester and the glass substrate is in the form of a hot glass ribbon, which is at a temperature in the range 500°C to 720°C during a float glass production process.

Support for the invention as claimed in claim 1 can be found throughout the application, but particularly:

Solar control glass is mentioned throughout the specification, including, for example, page 1, lines 1-20.

The CVD process can be found throughout the specification, for example on page 2, lines 19-24.

The float glass process can be found throughout the specification, for example on page 6, lines 1-4, with further detail shown page 6, lines 5-33.

Directing a gaseous stream comprising tungsten oxyhalide or tungsten chloride and a source of oxygen on to the surface of the glass substrate can be found, at least, on page 2, lines 19-24.

The source of oxygen comprising an ester can be found, at least, page 3, line 15, and in table 1.

The use of a hot glass ribbon is inherent to a float glass process but is specifically identified in the background section, and throughout pages 12 and 13.

The temperature range of 500°C to 720°C can be found, at least, in page 6, lines 5-11, and also in originally filed claim 24.

Independent claim 20 defines a chemical vapor deposition process for coating glass in an on-line float glass production process. The process includes directing a gaseous stream containing a tungsten compound and a source of oxygen on to the surface of a glass substrate thereby forming a non-stoichiometric tungsten oxide layer. The tungsten oxide layer is overcoated with a further layer and wherein the source of oxygen comprises an ester.

The CVD process can be found throughout the specification, for example on page 2, lines 19-24.

The float glass process can be found throughout the specification, for example on page 6, lines 1-4, with further detail shown page 6, lines 5-33.

Directing a gaseous stream comprising tungsten oxyhalide or tungsten chloride and a source of oxygen on to the surface of the glass substrate can be found, at least, on page 2, lines 19-24.

Support for the non-stoichiometric layer can be found, at least, in originally filed claim 9, and page 2 lines 13-18 and page 4, lines 3-15.

Support for the additional layer can be found, at least, on page 5, lines 10-19.

The source of oxygen comprising an ester can be found, at least, page 3, line 15, and in table 1.

Claim 38 defines a chemical vapor deposition process for coating glass in an on-line float glass production process. A tungsten compound is entrained in a gas by flowing the gas over a tungsten compound at a temperature below its melting point and directing the gaseous stream on to the surface of a glass substrate in the presence of an oxidant thereby forming a tungsten oxide layer, wherein the glass substrate is at a temperature in the range of 500°C to 720°C. The oxidant comprises an ester.

The CVD process can be found throughout the specification, for example on page 2, lines 19-24.

The float glass process can be found throughout the specification, for example on page 6, lines 1-4, with further detail shown page 6, lines 5-33.

Support for entraining the tungsten compound in the gas flow is found throughout the examples and, at least, page 4, line 24 through page 5, line 5.

The temperature range of 500°C to 720°C can be found, at least, in page 6, lines 5-11, and also in originally filed claim 24.

The source of oxygen comprising an ester can be found, at least, page 3, line 15, and in table 1.

Claim 40 defines a method of coating glass in an on-line chemical vapor deposition, float glass production process. A glass substrate is provided having a temperature in the range of 500°C to 720°C, and a gaseous stream comprising a source of oxygen which comprises an ester and a tungsten compound selected from the group consisting essentially of tungsten oxyhalide and tungsten chloride is prepared and directed on to the glass substrate, thereby depositing a coating comprising tungsten oxide on the glass substrate.

Support for the invention as claimed in claim 40 can be found throughout the application, but particularly:

The CVD process can be found throughout the specification, for example on page 2, lines 19-24.

The float glass process can be found throughout the specification, for example on page 6, lines 1-4, with further detail shown page 6, lines 5-33.

The temperature range of 500°C to 720°C can be found, at least, in page 6, lines 5-11, and also in originally filed claim 24.

Directing a gaseous stream comprising tungsten oxyhalide or tungsten chloride and a source of oxygen on to the surface of the glass substrate can be found, at least, on page 2, lines 19-24.

Claim 41 defines a process for depositing a coating comprising tungsten oxide on the surface of a glass substrate in an on-line chemical vapor deposition, float glass

production process. A gaseous stream comprising tungsten oxyhalide or tungsten chloride and an ester is directed on to the surface of the glass substrate.

Support for the invention as claimed in claim 41 can be found throughout the application, but particularly:

The CVD process can be found throughout the specification, for example on page 2, lines 19-24.

The float glass process can be found throughout the specification, for example on page 6, lines 1-4, with further detail shown page 6, lines 5-33.

Directing a gaseous stream comprising tungsten oxyhalide or tungsten chloride and a source of oxygen to the surface of the glass substrate can be found, at least, on page 2, lines 19-24.

The source of oxygen comprising an ester (and thus directing an ester to the glass surface) can be found, at least, page 3, line 15, and in table 1.

6. Grounds for Rejection to be Reviewed on Appeal

On July 12, 2006, the Examiner issued an Office Action in connection with the present application. This Office Action was made final. The Examiner maintained his rejection of all of the pending claims from the preceding Office Action. Namely:

A) Claims 1, 2, 4, 6-9, 17-22, 34-37 and 40-44 were rejected under 35 USC §103 as being unpatentable over Gallego et al (US 6,048,621) in view of Tracey et al. (US 4,687,560) and Florczak (US 6,268,019).

B) Claims 1, 2, 6-8, 10-16, 18, 23, 34-35, 38-42 and 44 were rejected under 35 USC §103 as being unpatentable over Riaz et al (US 5,385,751) in view of Tracey et al. (US 4,687,560) and Florczak (US 6,268,019).

C) Claims 1, 2, 8, 10-14, 17, 19, 34, 38-40 and 42 44 were rejected under 35 USC §103 as being unpatentable over Florczak (US 6,268,019) in view of Proscia et al (US 5,324,537), or vice versa, in view of Riaz et al (US 5,385,751).

D) Claims 1-4, 8, 10-14, 18, 34, 38-40, 42 and 44 were rejected under 35 USC §103 as being unpatentable over Proscia et al (US 5,324,537) in view of Tracey et al. (US 4,687,560) and Florczak (US 6,268,019) and further in view of Riaz et al (US 5,385,751).

7. Arguments

Claims 1, 2-4, 6-19, 34-37 and 42-44 stand or fall together and will be argued collectively herein, in particular with regard to independent claim 1, which was rejected under combinations a), b), c) and d).

Similarly, claims 20-22 stand or fall together and will be argued collectively herein, in particular with regard to independent claim 20, which was rejected under combination b).

Claims 38 and 39 stand or fall together and will be argued collectively herein, in particular with regard to independent claim 38, which was rejected under combinations b), c) and d).

Independent claim 40 stands independently, and was rejected under combinations a), b), c) and d).

Independent claim 41 stands independently, and was rejected under combinations a) and b).

A) Rejections of Claims 1, 2, 4, 6-9, 17-22, 34-37 and 40-44 under 35 USC §103 as being unpatentable over Gallego et al (US 6,048,621) in view of Tracey et al. (US 4,687,560) and Florczak (US 6,268,019).

A1) Rejection of Claim 1

The Examiner acknowledges that Gallego does not teach the use of Tungsten oxyhalides or tungsten chlorides as defined in claim 1. The Examiner relies on the disclosures of Tracy and Florczak to overcome this deficiency.

Claim 1 defines a chemical vapor deposition process for depositing a coating comprising tungsten oxide in an on-line float glass production process on the surface of a glass substrate to produce a solar control glass which transmits a high percentage of incident light. A gaseous stream comprising tungsten oxyhalide or tungsten chloride and a source of oxygen, which comprises an ester, is directed on to the surface of the glass substrate. The glass substrate is in the form of a hot glass ribbon, which is at a temperature in the range 500°C to 720°C during a float glass production process.

The Examiner previously noted that the claims of the present application do not exclude plasma. The present invention is drawn to an on-line float glass process. Plasma enhanced CVD, as noted in the Tracey reference, occurs in a closed reaction chamber at very low pressure. An on-line process, as in the present application, is a continuous process occurring in an open system. At the time that the present application was filed, the fact that the present invention occurs in an open system automatically would certainly preclude, to one skilled in the art, a plasma enhanced CVD process, as such a closed process would be inherently incompatible with on-line processes.

The Examiner goes on to state that the use of the plasma is merely the provision of energy by different means. As noted above, the on-line process of the present

invention occurs in an open system as opposed to the closed system of a plasma enhanced CVD process. Certainly, at the time the present invention was made, there was no suggestion that a plasma-enhanced process would be in any way compatible with an on-line float glass process. The plasma enhanced process of Tracey can achieve desired deposition rates merely by allowing the process to continue until a suitable coating thickness is deposited. In an on-line process, the glass sheet is moving at a significant speed through the coater, and there is thus a very limited amount of time available for the desired coating thickness to be achieved. Thus, in view of differing conditions, differing necessary deposition rates and other factors, there is no reason to suggest that the precursors suitable for a closed plasma-enhanced CVD process would be suitable for an on-line float glass process. The Examiner's suggestion that this is merely the provision of energy by differing means is true to a point, but certainly fails to consider many other variables that are inherently present in an on-line process as opposed to a closed process.

Attachment A, which was entered during prosecution, is a declaration from inventor Kevin Sanderson, who is an expert in the field. In paragraph 9 of the declaration, Mr. Sanderson notes that precursor choice is significant in on-line coating processes because of the volatility and stability of the precursors of the metal oxide. Thermal decomposition and pre-reaction must both be avoided in on-line processes. A significant discovery reflected in this invention, as noted in paragraph 10, is that the use of precursors tungsten oxy halide or tungsten chloride, both of which are delivered as sublimed metals, volatilize to form a sufficient vapor stream, and when mixed with an oxidant which contains an ester, they do not pre react.

The Gallego reference is discussed in paragraphs 17 and 18 of the declaration, and refers back to paragraph 11 relating to the Proscia reference. The Gallego reference, as discussed in paragraph 17 of the declaration, utilizes a plasma assisted CVD process. In paragraphs 12 and 13 of the declaration, Mr. Sanderson attests that plasma assisted CVD requires that the reactants are vaporized at low temperatures and pressures. No reaction occurs until power is applied to generate a plasma. As attested, there is no possibility of a pre reaction in a plasma assisted CVD process, and so this significant concern of the present invention is a non-factor in the Gallego reference.

The utility of on-line CVD processes is inherently dependent upon the deposition rate, as an on-line process has a finite time for the deposition of the desired coating. This is not the case in plasma assisted CVD processes (which are not on-line), in that the power can be applied, and thus the deposition can continue until a coating of the desired thickness is achieved. Thus, as attested to by Mr. Sanderson, one skilled in the art of on-line CVD processes *would not look to plasma assisted CVD* processes for precursors, as both the reaction conditions, and process concerns (pre reaction and deposition rate) are significantly different.

The Florczak reference is also addressed in paragraphs 14, 15 and 16 of the declaration of Mr. Sanderson. Particularly in paragraph 15 it is noted that separate streams of reaction gas and carrier gas with titanium tetrachloride vapor *must be employed* to prevent pre reaction. This requirement of Florczak is contrary to the teaching of the present invention, wherein the gaseous precursor stream contains both the tungsten precursor and the oxidant. The separate streams required by Florczak are not particularly suitable for use in an on-line process. Thus Florczak is not suitable to

be combined into an on-line float gas process as is done by the Examiner. Even if it were to be used in conjunction with the Gallego and Tracy references, the present invention would show a significant improvement over the art in that the precursors could be combined, simplifying the invention.

The Tracy reference is discussed in paragraphs 12, 13 and 16 of the declaration. As with Gallego, Tracy uses a plasma assisted CVD process. For the same reasons as shown with Gallego, a plasma assisted CVD process is not suitable for use with the present invention. Nor is it suitable to be used in combination with a reference showing an atmospheric pressure CVD process.

The proposed combination of secondary references Tracy and Florczak suffers from additional deficiencies. As noted above, the Tracy reference is not applicable to the present invention because it teaches a different process, not one that a person skilled in the art would look to when designing an on-line CVD process. With regard to Florczak, while this reference teaches a CVD method, nothing in this reference is relevant to the *deposition of tungsten oxide*. Florczak primarily addresses the deposition of titania using the reactor described in Figure 1 of the reference. Only in the abstract, and at column 6, line 55, does Florczak suggest the use of the process with any other metals. Even here, the only other suggested metals are tin germanium and vanadium. There is *nothing to suggest to one skilled in the art that the processes of Florczak would be compatible with metals outside this group, and certainly not to tungsten*. As there is no suggestion in Tracy to use a chemical vapor deposition process, and no suggestion in Florczak that the process described therein would be compatible with any metals not listed, i.e. tungsten, there is nothing in either reference

to lead one skilled in the art to combine those references. Therefore, it is respectfully submitted that the combination of these references with Gallego is improper.

Thus, it is submitted that independent claim 1, and the claims dependent therefrom, are allowable over this combination.

A2) Rejection of Claim 20

Claim 20 defines a chemical vapor deposition process for coating glass in an on-line float glass production process. A gaseous stream containing a tungsten compound and a source of oxygen is directed on to the surface of a glass substrate thereby forming a non-stoichiometric tungsten oxide layer wherein the tungsten oxide layer is overcoated with a further layer. The source of oxygen comprises an ester.

As with claim 1, claim 20 requires the deposition of a tungsten oxide layer in an on-line, float glass production process, through the use of a gaseous stream containing a tungsten compound and a source of oxygen. The Examiner makes no specific comments regarding claim 20 in this rejection.

The Examiner is again referred to Attachment A significant in on-line coating processes because of the volatility and stability of the precursors of the metal oxide. Thermal decomposition and pre-reaction must both be avoided in on-line processes. A significant discovery reflected in this invention, as noted in paragraph 10, is that the use of precursors tungsten oxy halide or tungsten chloride, both of which are delivered as sublimed metals, volatilize to form a sufficient vapor stream, and when mixed with an oxidant which contains an ester, they do not pre react.

Again, Gallego utilizes a plasma assisted CVD process. In paragraphs 12 and 13 of the declaration, Mr. Sanderson attests that plasma assisted CVD requires that the reactants are vaporized at low temperatures and pressures. No reaction occurs until power is applied to generate a plasma. As attested, there is no possibility of a pre reaction in a plasma assisted CVD process, and so this significant concern of the present invention is a non-factor in the Gallego reference.

The utility of on-line CVD processes is inherently dependent upon the deposition rate, as an on-line process has a finite time for the deposition of the desired coating. This is not the case in plasma assisted CVD processes (which are not on-line), in that the power can be applied, and thus the deposition can continue until a coating of the desired thickness is achieved. Thus, as attested to by Mr. Sanderson, one skilled in the art of on-line CVD processes *would not look to plasma assisted CVD* processes for precursors, as both the reaction conditions, and process concerns (pre reaction and deposition rate) are significantly different.

The Florczak reference is also addressed in paragraphs 14, 15 and 16 of the declaration of Mr. Sanderson. Particularly in paragraph 15 it is noted that separate streams of reaction gas and carrier gas with titanium tetrachloride vapor *must be employed* to prevent pre reaction. This requirement of Florczak is contrary to the teaching of the present invention, wherein the gaseous precursor stream contains both the tungsten precursor and the oxidant. The separate streams required by Florczak are not particularly suitable for use in an on-line process. Thus Florczak is not suitable to be combined into an on-line float gas process as is done by the Examiner. Even if it were to be used in conjunction with the Gallego and Tracy references, the present

invention would show a significant improvement over the art in that the precursors could be combined, simplifying the invention.

The Tracy reference is discussed in paragraphs 12, 13 and 16 of the declaration. As with Gallego, Tracy uses a plasma assisted CVD process. For the same reasons as shown with Gallego, a plasma assisted CVD process is not suitable for use with the present invention. Nor is it suitable to be used in combination with a reference showing an atmospheric pressure CVD process.

The proposed combination of secondary references Tracy and Florczak suffers from additional deficiencies. As noted above, the Tracy reference is not applicable to the present invention because it teaches a different process, not one that a person skilled in the art would look to when designing an on-line CVD process. With regard to Florczak, while this reference teaches a CVD method, nothing in this reference is relevant to the *deposition of tungsten oxide*. Florczak primarily addresses the deposition of titania using the reactor described in Figure 1 of the reference. Only in the abstract, and at column 6, line 55, does Florczak suggest the use of the process with any other metals. Even here, the only other suggested metals are tin germanium and vanadium. There is *nothing to suggest to one skilled in the art that the processes of Florczak would be compatible with metals outside this group, and certainly not to tungsten.* As there is no suggestion in Tracy to use a chemical vapor deposition process, and no suggestion in Florczak that the process described therein would be compatible with any metals not listed, i.e. tungsten, there is nothing in either reference to lead one skilled in the art to combine those references. Therefore, it is respectfully submitted that the combination of these references with Gallego is improper.

Thus, it is submitted that independent claim 20, and the claims dependent therefrom, are allowable over this combination.

A3) Rejection of Claim 40

Claim 40 defines a method of coating glass in an on-line chemical vapor deposition, float glass production process. The method comprises providing a glass substrate having a temperature in the range of 500°C to 720°C, preparing a gaseous stream comprising a source of oxygen which comprises an ester and a tungsten compound selected from the group consisting essentially of tungsten oxyhalide and tungsten chloride; and directing the gaseous stream on to the glass substrate, thereby depositing a coating comprising tungsten oxide on the glass substrate.

The analysis of claim 40 is very similar to the analysis of claim 1, hereinabove. As in claim 1, claim 40 is an on-line, CVD, float glass process utilizing of a compound selected from tungsten oxyhalide and tungsten chloride as precursors.

It is submitted that claim 40 is allowable for the reasons stated above with respect to claim 1.

A4) Rejection of Claim 41

Claim 41 defines a process for depositing a coating comprising tungsten oxide on the surface of a glass substrate in an on-line chemical vapor deposition, float glass

production process. A gaseous stream comprising tungsten oxyhalide or tungsten chloride and an ester is directed on to the surface of the glass substrate.

Again, as with claims 1 and 40, claim 41 utilizes one of tungsten oxyhalide or tungsten chloride in an on-line, float glass CVD process. For the reasons stated hereinabove with respect to claim 1, it is submitted that this claim is also allowable.

B) Rejection of Claims 1, 2, 6-8, 10-16, 18, 23, 34-35, 38-42 and 44 under 35 USC §103 as being unpatentable over Riaz et al (US 5,385,751) in view of Tracey et al. (US 4,687,560) and Florczak (US 6,268,019).

B1) <u>Rejection of Claim 1</u>

Claim 1 defines a chemical vapor deposition process for depositing a coating comprising tungsten oxide in an on-line float glass production process on the surface of a glass substrate to produce a solar control glass which transmits a high percentage of incident light. A gaseous stream comprising tungsten oxyhalide or tungsten chloride and a source of oxygen, which comprises an ester, is directed on to the surface of the glass substrate. The glass substrate is in the form of a hot glass ribbon, which is at a temperature in the range 500°C to 720°C during a float glass production process.

The Riaz reference is discussed at length in the inventor's declaration in paragraphs 19-23. Mr. Sanderson points out that Riaz discloses a CVD process for the deposition of a fluorine doped tungsten oxide coating on the surface of a glass substrate. Mr. Sanderson notes that the Riaz reference requires separate reaction

streams to avoid a propensity to pre react. In paragraph 22, Mr. Sanderson explains in additional detail why the applied references are not applicable to on-line processes.

The Examiner acknowledged that Riaz does not explicitly teach the use of applicant's tungsten precursor. Applicants assert that Riaz specifically teaches the use of a tungsten alkoxide precursor in a CVD process. Riaz does not explicitly or implicitly, suggest any other tungsten containing precursor. Thus, it is respectfully submitted that the disclosure of Riaz is no broader than the disclosure of the Gallego reference. Therefore, the same assertions made with regard to Gallego are also applicable against the rejection based on Riaz.

As above, applicant respectfully asserts that Tracy does not disclose a chemical vapor deposition process, as is claimed in the amended independent claims, but instead teaches a plasma deposition process, which is significantly different, and would be so recognized by one skilled in the art. Tracy, as demonstrated above, thus teaches that the reactants tungsten chloride and tungsten oxytetrachloride are useful in deposition processes carried out under vacuum, at low temperature and which use electrical energy to drive plasma formation. These processes are different from, and in fact are irrelevant to the chemical vapor deposition processes of the present invention, which are carried out at atmospheric pressure and high temperature, and which use heat to drive the reaction and not electrical energy. Thus, one skilled in the art would not look to the Tracy reference as being relevant to the present invention. Therefore, the use of the Tracy reference against the present invention is improper.

Also, the use of Tracy and Florczak together suffers from the same deficiencies asserted above. The Tracy reference is not applicable to the present invention because it teaches a different process, not one that a person skilled in the art would look to when designing a CVD process. With regard to Florczak, while this reference teaches a CVD method, nothing in this reference is relevant to the *deposition of tungsten oxide*. Florczak primarily addresses the deposition of titania using the reactor described in Figure 1 of the reference. Only in the abstract, and at column 6, line 55, does Florczak suggest the use of the process with any other metals. Even here, the only other suggested metals are tin germanium and vanadium. There is *nothing to suggest to one skilled in the art that the processes of Florczak would be compatible with metals outside this group, and certainly not to tungsten*. As there is no suggestion in Tracy to use a chemical vapor deposition process, and no suggestion in Florczak that the process described therein would be compatible with any metals not listed, i.e. tungsten, there is nothing in either reference to lead one skilled in the art to combine those references. Therefore, it is respectfully submitted that the combination of these references is improper.

Thus, it is submitted that independent claim 1 is also distinguishable over this combination of references.

B2) <u>Rejection of Claim 38</u>

Claim 38 defines a chemical vapor deposition process for coating glass in an on-line float glass production process. A tungsten compound is entrained in a gas by

flowing the gas over a tungsten compound at a temperature below its melting point and directing the gaseous stream on to the surface of a glass substrate in the presence of an oxidant thereby forming a tungsten oxide layer. The glass substrate is at a temperature in the range of 500°C to 720°C, and the oxidant comprises an ester.

It is respectfully submitted that nothing in the Riaz reference discloses the present invention as claimed in claim 38. Claim 38 defines that the tungsten compound is entrained in a gas by flowing the gas over a tungsten compound at a temperature below its melting point and directing the gaseous stream on to the surface of a glass substrate in the presence of an oxidant thereby forming a tungsten oxide layer, wherein the oxidant comprises an ester.

For the reasons given above, it is respectfully submitted that it is improper to combine the Tracey and Florczak references with the Riaz reference. It is therefore submitted that claim 38 distinguishes over this combination of references.

B3) <u>Rejection of Claim 40</u>

Claim 40 defines a method of coating glass in an on-line chemical vapor deposition, float glass production process. The method comprises providing a glass substrate having a temperature in the range of 500°C to 720°C, preparing a gaseous stream comprising a source of oxygen which comprises an ester and a tungsten compound selected from the group consisting essentially of tungsten oxyhalide and tungsten chloride; and directing the gaseous stream on to the glass substrate, thereby depositing a coating comprising tungsten oxide on the glass substrate.

Again, claim 30 contains similar subject matter to that defined in claim 1. The Riaz reference is not applicable to on-line processes as noted in the declaration of Mr. Sanderson.

The Examiner acknowledged that Riaz does not explicitly teach the use of applicant's tungsten precursor. Applicants assert that Riaz specifically teaches the use of a tungsten alkoxide precursor in a CVD process. Riaz does not explicitly or implicitly, suggest any other tungsten containing precursor. Thus, it is respectfully submitted that the disclosure of Riaz is no broader than the disclosure of the Gallego reference. Therefore, the same assertions made with regard to Gallego are also applicable against the rejection based on Riaz.

As above, applicant respectfully asserts that Tracy does not disclose a chemical vapor deposition process, as is claimed in the amended independent claims, but instead teaches a plasma deposition process, which is significantly different, and would be so recognized by one skilled in the art. Tracy, as demonstrated above, thus teaches that the reactants tungsten chloride and tungsten oxytetrachloride are useful in deposition processes carried out under vacuum, at low temperature and which use electrical energy to drive plasma formation. These processes are different from, and in fact are irrelevant to the chemical vapor deposition processes of the present invention, which are carried out at atmospheric pressure and high temperature, and which use heat to drive the reaction and not electrical energy. Thus, one skilled in the art would not look to the Tracy reference as being relevant to the present invention. Therefore, the use of the Tracy reference against the present invention is improper.

Also, the use of Tracy and Florczak together suffers from the same deficiencies asserted above. The Tracy reference is not applicable to the present invention because it teaches a different process, not one that a person skilled in the art would look to when designing a CVD process. With regard to Florczak, while this reference teaches a CVD method, nothing in this reference is relevant to the *deposition of tungsten oxide*. Florczak primarily addresses the deposition of titania using the reactor described in Figure 1 of the reference. Only in the abstract, and at column 6, line 55, does Florczak suggest the use of the process with any other metals. Even here, the only other suggested metals are tin germanium and vanadium. There is *nothing to suggest to one skilled in the art that the processes of Florczak would be compatible with metals outside this group, and certainly not to tungsten*. As there is no suggestion in Tracy to use a chemical vapor deposition process, and no suggestion in Florczak that the process described therein would be compatible with any metals not listed, i.e. tungsten, there is nothing in either reference to lead one skilled in the art to combine those references. Therefore, it is respectfully submitted that the combination of these references is improper.

Claim 40 is therefore believed to distinguish over this combination of references.

B4) <u>Rejection of Claim 41</u>

Claim 41 defines a process for depositing a coating comprising tungsten oxide on the surface of a glass substrate in an on-line chemical vapor deposition, float glass

production process. A gaseous stream comprising tungsten oxyhalide or tungsten chloride and an ester is directed on to the surface of the glass substrate.

Again, as with claims 1 and 40, claim 41 utilizes one of tungsten oxyhalide or tungsten chloride in an on-line, float glass CVD process. For the reasons stated hereinabove with respect to claim s1 and 40, it is submitted that this claim is also allowable.

C) Rejection of Claims 1, 2, 8, 10-14, 17, 19, 34, 38-40 and 42 44 under 35 USC §103 as being unpatentable over Florczak (US 6,268,019) in view of Proscia et al (US 5,324,537), or vice versa, in view of Riaz et al (US 5,385,751).

C1) Rejection of Claim 1

Claim 1 defines a chemical vapor deposition process for depositing a coating comprising tungsten oxide in an on-line float glass production process on the surface of a glass substrate to produce a solar control glass which transmits a high percentage of incident light. A gaseous stream comprising tungsten oxyhalide or tungsten chloride and a source of oxygen, which comprises an ester, is directed on to the surface of the glass substrate. The glass substrate is in the form of a hot glass ribbon, which is at a temperature in the range 500°C to 720°C during a float glass production process.

Each of the Florczak, Proscia and Riaz references have been discussed above. In light of the fact that the present invention requires an on-line oat glass process, it is respectfully submitted that this process is not obvious over the applied references, for

the reasons given above. It is respectfully submitted that this claim 1 fully distinguishes over the applied art of record.

C2) Rejection of Claim 38

Claim 38 defines a chemical vapor deposition process for coating glass in an on-line float glass production process A tungsten compound is entrained in a gas by flowing the gas over a tungsten compound at a temperature below its melting point and directing the gaseous stream on to the surface of a glass substrate in the presence of an oxidant thereby forming a tungsten oxide layer. The glass substrate is at a temperature in the range of 500°C to 720°C , and the oxidant comprises an ester.

Each of the Florczak, Proscia and Riaz references have been discussed above. In light of the fact that the present invention requires an on-line oat glass process, it is respectfully submitted that this process is not obvious over the applied references, for the reasons given above. It is respectfully submitted that this claim 38 fully distinguishes over the applied art of record.

C3) Rejection of Claim 40

Claim 40 defines a method of coating glass in an on-line chemical vapor deposition, float glass production process. The method comprises providing a glass substrate having a temperature in the range of 500°C to 720°C, preparing a gaseous stream comprising a source of oxygen which comprises an ester and a tungsten compound selected from the group consisting essentially of tungsten oxyhalide and

tungsten chloride; and directing the gaseous stream on to the glass substrate, thereby depositing a coating comprising tungsten oxide on the glass substrate.

Each of the Florczak, Proscia and Riaz references have been discussed above. In light of the fact that the present invention requires an on-line oat glass process, it is respectfully submitted that this process is not obvious over the applied references, for the reasons given above. It is respectfully submitted that this claim 40 fully distinguishes over the applied art of record.

D) Rejection of Claims 1-4, 8, 10-14, 18, 34, 38-40, 42 and 44 under 35 USC §103 as being unpatentable over Proscia et al (US 5,324,537) in view of Tracey et al. (US 4,687,560) and Florczak (US 6,268,019) and further in view of Riaz et al (US 5,385,751).

D1) Rejection of Claim 1

Claim 1 defines a chemical vapor deposition process for depositing a coating comprising tungsten oxide in an on-line float glass production process on the surface of a glass substrate to produce a solar control glass which transmits a high percentage of incident light. A gaseous stream comprising tungsten oxyhalide or tungsten chloride and a source of oxygen, which comprises an ester, is directed on to the surface of the glass substrate. The glass substrate is in the form of a hot glass ribbon, which is at a temperature in the range 500°C to 720°C during a float glass production process.

Proscia, Tracey, Florczak and Riaz have each been discussed hereinabove. For the reasons given above, it is respectfully submitted that it is not proper to combine these references, and even if these references were to be combinaed, they would not show the use of a gaseous stream comprising tungsten oxyhalide or tungsten chloride in an on-line, float glass, CVD process. It is therefore submitted that claim 1 defines over the applied references.

D2) Rejection of Claim 38

Claim 38 defines a chemical vapor deposition process for coating glass in an on-line float glass production process. A tungsten compound is entrained in a gas by flowing the gas over a tungsten compound at a temperature below its melting point and directing the gaseous stream on to the surface of a glass substrate in the presence of an oxidant thereby forming a tungsten oxide layer. The glass substrate is at a temperature in the range of 500°C to 720°C, and the oxidant comprises an ester.

Again, Proscia, Tracey, Florczak and Riaz have each been discussed hereinabove. For the reasons given above, it is respectfully submitted that it is not proper to combine these references, and even if these references were to be combinaed, they would not show the deposition of a tungsten oxide layer in an on-line, float glass, CVD process. It is therefore submitted that claim 38 defines over the applied references.

D3) Rejection of Claim 40

Claim 40 defines a method of coating glass in an on-line chemical vapor deposition, float glass production process. The method comprises providing a glass substrate having a temperature in the range of 500°C to 720°C, preparing a gaseous stream comprising a source of oxygen which comprises an ester and a tungsten compound selected from the group consisting essentially of tungsten oxyhalide and tungsten chloride; and directing the gaseous stream on to the glass substrate, thereby depositing a coating comprising tungsten oxide on the glass substrate.

Proscia, Tracey, Florczak and Riaz have each been discussed hereinabove. For the reasons given above, it is respectfully submitted that it is not proper to combine these references, and even if these references were to be combinaed, they would not show the use of a gaseous stream comprising tungsten oxyhalide or tungsten chloride in an on-line, float glass, CVD process. It is therefore submitted that claim 40 defines over the applied references.

CONCLUSION

In view of the above arguments, it is therefore respectfully submitted that each of the independent claims are allowable over the applied art of record. As claims 1, 20, 38, 40 and 41 are patentable for the reasons discussed, and as claims 2-4, 6-19, 21-22, 34-37, 39 and 42-44 depend directly or indirectly from these independent claims, applicant submits claims 2-4, 6-19, 21-22, 34-37, 39 and 42-44 are likewise patentable. An expeditious determination by the Board to that effect is respectfully requested.

Respectfully submitted,

Mark A. Hixon
Registration No. 44,766

Attorneys:
MARSHALL & MELHORN, LLC
Four SeaGate, 8th Floor
Toledo, OH 43604
419-249-7114
419-249-7151 – Fax
Hixon@marshall-melhorn.com

CLAIMS APPENDIX

1. A chemical vapor deposition process for depositing a coating comprising tungsten oxide in an on-line float glass production process on the surface of a glass substrate to produce a solar control glass which transmits a high percentage of incident light, comprising directing a gaseous stream comprising tungsten oxyhalide or tungsten chloride and a source of oxygen on to the surface of the glass substrate, wherein the source of oxygen comprises an ester and wherein the glass substrate is in the form of a hot glass ribbon, which is at a temperature in the range 500°C to 720°C during a float glass production process.

2. A process according to claim 1 wherein the coating comprising tungsten oxide comprises a layer of tungsten oxide.

3. A process according to claim 1 wherein tungsten oxyhalide comprises a tungsten oxychloride.

4. A process according to claim 1 wherein tungsten oxyhalide or tungsten chloride comprises a substituted tungsten oxyhalide or tungsten chloride.

5. (canceled)

6. A process according to claim 1 wherein the ester has from 3 to 6 carbon atoms.

7. A process according to claim 1 wherein the ester is ethyl acetate or butyl acetate.

8. A process according to claim 1 wherein the gaseous stream contains oxygen gas.

9. A process according to claim 1 wherein the ratio of tungsten oxyhalide or tungsten chloride and the source of oxygen are such that the layer of tungsten oxide is deposited as non-stoichiometric tungsten oxide.

10. A process according to claim 1 wherein the gaseous stream contains a source of fluorine.

11. A process according to claim 10 wherein the source of fluorine comprises hexafluoroethane, trifluoroacetic acid or hexafluoropropylene oxide.

12. A process according to claim 1 wherein tungsten oxyhalide or tungsten chloride is entrained in the gaseous stream by flowing inert gas over hot tungsten oxyhalide or tungsten chloride.

13. A process according to claim 12 wherein tungsten oxyhalide or tungsten chloride is at a temperature in the range 170°C to 210°C.

14. A process according to claim 12 wherein the inert gas comprises nitrogen.

15. A process according to claim 1 wherein the source of oxygen is entrained in the gaseous stream by contacting said ester with a flowing inert gas.

16. A process according to claim 15 wherein the ester is at a temperature in the range 30°C to 45°C.

17. A process according to claim 1 wherein the tungsten oxide layer has a thickness in the range 70 to 180 nm.

18. A process according to claim 1 wherein the tungsten oxide layer is deposited at a growth rate in the range 3 to 25 nm s^{-1}.

19. A process according to claim 1 wherein the tungsten oxide layer is overcoated with a further layer.

20. A chemical vapor deposition process for coating glass in an on-line float glass production process comprising directing a gaseous stream containing a tungsten compound and a source of oxygen on to the surface of a glass substrate thereby forming a non-stoichiometric tungsten oxide layer wherein the tungsten oxide layer is overcoated with a further layer and wherein the source of oxygen comprises an ester.

21. A process according to claim 20 wherein the further layer comprises a metal oxide.

22. A process according to claim 20 wherein the further layer comprises fluorine doped tin oxide.

23-33. (canceled)

34. A process according to claim 1 wherein the glass substrate is at a temperature in the range 565°C to 655°C.

35. A process according to claim 1 wherein the tungsten oxide layer is deposited on to coated glass.

36. A process according to claim 35 wherein the coated glass has a coating comprising silicon oxide.

37. A process according to claim 36 wherein the coating comprising silicon oxide further contains carbon.

38. A chemical vapor deposition process for coating glass in an on-line float glass production process comprising entraining a tungsten compound in a gas by flowing the gas over a tungsten compound at a temperature below its melting point and directing the gaseous stream on to the surface of a glass substrate in the presence of an oxidant thereby forming a tungsten oxide layer, wherein the glass substrate is at a temperature in the range of 500°C to 720°C , wherein the oxidant comprises an ester.

39. A process according to claim 38 wherein the tungsten compound is tungsten halide, tungsten oxyhalide or tungsten carbonyl.

40. A method of coating glass in an on-line chemical vapor deposition, float glass production process comprising

(a) providing a glass substrate having a temperature in the range of 500°C to 720°C,

(b) preparing a gaseous stream comprising a source of oxygen which comprises an ester and a tungsten compound selected from the group consisting essentially of tungsten oxyhalide and tungsten chloride; and

(c) directing the gaseous stream on to the glass substrate, thereby depositing a coating comprising tungsten oxide on the glass substrate.

41. A process for depositing a coating comprising tungsten oxide on the surface of a glass substrate in an on-line chemical vapor deposition, float glass production process, by directing a gaseous stream comprising tungsten oxyhalide or tungsten chloride and an ester on to the surface of the glass substrate.

42. A coated glass produced by a process according to claim 1.

43. A multiple glazing unit comprising a coated glass according to claim 42 in spaced opposed relation to a glazing pane.

44. A process according to claim 1 wherein the tungsten oxyhalide comprises tungsten oxytetrachloride.

EVIDENCE APPENDIX

Declaration under 37 CFR §1.132 by the inventor, Mr. Kevin Sanderson, dated August 10, 2005, and originally filed with the response dated August 11, 2005. A copy of this declaration follows.

RELATED PROCEEDINGS APPENDIX

none

PATENT APPLICATION IN THE
UNITED STATES PATENT AND TRADE MARK OFFICE

In re. application of Sanderson

Docket No. 1-15240

Application No. 09/744,420

Group Art Unit 1762

Confirmation No. 5624

Filed 03/06/2001

Examiner Eric B Fuller

DECLARATION UNDER 37C.F.R. 1.132

Commissioner for Patents
PO Box 1450
Alexandria
VA 22313 - 1450

Sir

I, Kevin David Sanderson hereby declare and state

1 I am a citizen of the United Kingdom and my current address is 5 Dewberry Field, Upholland, Wigan, WN8 0BQ, Greater Manchester, United Kingdom.

2 I have been awarded the degrees of Bachelor of Science and Doctor of Philosophy from Imperial College of Science Technology and Medicine which is part of the University of London. I have extensive experience in the area of thin film coating on glass including specifically metal oxide coatings deposited on a continuous glass ribbon as part of a float glass production process.

3 I have been employed by Pilkington plc since 1995 and am currently employed in the position of Principle Project Manager in the area of on line coating of glass.

4 I am the sole inventor of the processes claimed in the above application. I have been asked to comment upon the issues raised in the final rejection of the above application dated 03/11/05. To this end I have read that rejection, the art cited as the basis for that rejection and the amended claims which are the subject of that rejection.

5 The claims of the patent application are directed to a process for depositing a coating comprising tungsten oxide on-line during a float glass production process. The process comprises directing a gaseous stream comprising tungsten oxyhalide or tungsten chloride and a source of oxygen on to the

surface of a hot glass ribbon. I understand that these claims will be amended prior to the filing of this declaration to specify that the source of oxygen comprises an ester.

6 The float glass production process was developed by Pilkington over forty years ago and is now used to produce the vast majority of the flat glass produced anywhere in the world (an estimate of production in 2004 is that 35 million tonnes of flat glass were produced of which 31 million tonnes were produced using the float process). The float process is described e.g. in British Patent GB 769692. A ribbon of molten glass is allowed to flow over the surface of a bath of molten tin. As is stated in GB 769692 a non oxidising atmosphere is maintained over the bath to prevent oxidation of the surface of the molten tin. A slight plenum is preferably maintained in order to prevent the ingress of air.

7 On line coating processes of the type claimed in this application are widely used in the industry to deposit various metal oxide coatings on the glass ribbon. They comprise bringing a vapour stream comprising a volatile precursor of the metal oxide and an oxidant into contact with the glass at a point where the temperature of the glass drives the deposition reaction. Most commonly these processes are carried out in the float bath or in the annealing lehr where the temperature of the glass ranges from 400°C to 800°C. These processes are carried out at the pressure prevailing in the bath or lehr i.e. at or just above atmospheric pressure.

8 One important factor is assessing the utility of an on line coating process is the rate at which the coating is deposited. Because the float ribbon is continuous and is moving at speeds of from 10 to 15 metres/minute the coating process needs to have a high deposition rate if it is to be useful. The deposition rate required is proportional to the thickness of the coating which is required. It is possible to use more than one coater to deposit the coating but this is undesirable and in any event there is only room for a limited number of coaters in the bath.

9 A second important factor in assessing the utility of an on line process is the volatility and stability of the precursor of the metal oxide. The precursor must be one which is sufficiently volatile at a temperature which is below that at which it undergoes thermal decomposition. Furthermore the precursor should not pre react with the oxidant before the vapour stream comes into contact with the hot glass ribbon. Pre reaction leads to the formation of powdery deposits on the surface of the glass which is not acceptable.

10 The present invention is based upon my discovery that tungsten oxide coatings may be deposited on line using tungsten oxy halide or tungsten chloride as a precursor for a tungsten oxide by directing a gas stream comprising the precursor onto the ribbon at a point where the temperature of the ribbon is in the range 500° to 720°C. These precursors are solids which sublime when heated to form a vapour. Surprisingly I have discovered that they can be volatilised in sufficient concentration to form a useful vapour stream and further that when mixed with an oxidant which comprises an ester they do not

pre react. Also the vapour stream thus formed can be brought into contact with the hot glass ribbon to provide processes which have a high deposition rate and can used to produce a coating of the desired quality over an extended period. Furthermore they can be used to produce coatings having stoichiometric, non-stoichiometric and doped forms. I believe that the claimed processes represent a significant advance in the art and that they are not obvious in the light of the art cited by the Examiner.

11 USP 5286520 Proscia is equivalent to EP 54669 which is discussed in the application in suit. Proscia discloses a CVD process which deposits a coating comprising a fluorinated tungsten oxide upon the surface of a glass ribbon produced as part of the float glass process. Proscia discloses the use of tungsten hexafluoride as the tungsten precursor in his process. Tungsten hexafluoride is a volatile liquid which is easily vaporised and as such is suitable for use in a CVD process. These processes can only produce a fluorinated tungsten oxide and they have the disadvantage that the hydrogen fluoride produced in the reaction may significantly attack the surface of the glass at the high temperatures at which the process is carried out. Proscia does not disclose the use of a tungsten chloride or a tungsten oxyhalide as the tungsten precursor as the Examiner acknowledges on page 2 of the Official Action.

12 USP 4687560 Tracey describes a plasma deposition process for the production of a tungsten oxide coating on the surface of a glass substrate. Tracey states that plasma deposition occurs when an electrical discharge in a low pressure mixture of volatile reactants causes the formation of a variety of highly energetic species which chemically interact to form stable deposits. Tracey also states that moderate vapour pressure tungsten compounds capable of plasma oxidation may be utilised as reactants and provides a list of examples which includes tungsten chlorides and tungsten oxyhalides.

13 As a skilled man I would regard the teachings of Tracey as being unrelated to the present invention or to the disclosure of Proscia. Tracey vaporises his reactants at low temperature in a low pressure chamber. No reaction occurs until power is applied to generate a plasma. As he states he can use any tungsten precursor which has a boiling point of less than 500°C. There is no possibility of pre reaction. Furthermore the deposition rate is not a limiting factor because he simply maintains the power supply until the desired coating has been deposited. Thus the disclosure of Tracey really amounts to a simple recitation of those tungsten compounds which are relatively low boiling. This is not at all sufficient to suggest that they should be employed in place of the tungsten hexafluoride precursor disclosed by Proscia.

14 USP 6268019 Florczak discloses a CVD process for the deposition of a doped titanium oxide coating. His processes use titanium tetrachloride as the titanium precursor and he mentions in passing that his invention includes the use of other metal chlorides such as tin tetrachloride, germanium tetrachloride and vanadium tetrachloride in the processes of his invention. Florczak's invention is his discovery that introducing a fluorine dopant decreases the haze of his titanium dioxide films. He speculates that this haze reduction

would be exhibited in other metal oxides. This speculation is not convincing even in relation to tin, germanium and vanadium and I would not interpret it as reading onto other metals including in particular tungsten.

15 Florczak emphasises at column 4 lines 42 to 46 that separate streams of reaction gas (oxygen) and carrier gas with titanium tetrachloride vapour must be employed in order to avoid pre reaction. In practice this would be very difficult to achieve in the context of an on line deposition process. In contrast the claims of my application require the formation of a gaseous stream comprising the tungsten precursor and a source of oxygen which is an ester which stream is then brought into contact with the surface of the glass ribbon. This reflects a much reduced tendency for the precursor and oxidant to pre react. The claimed processes have a significant advantage because the reactants can be pre mixed rather than mixing the reactants at the last possible moment.

16 The Examiner's assertion that the claimed processes are obvious over Proscia in view of Tracey and Florczak is not in my opinion justified. As a skilled man I would not regard Tracey as being relevant to an atmospheric pressure CVD process. I would not regard as the combined teachings of Tracey and Florczak as teaching the utility of tungsten oxytetrachloride or tungsten chloride as a precursor in the processes of Proscia. The skilled man seeking an on-line process for the deposition of tungsten oxide would have no incentive to refer to these documents.

17 USP 604862 Gallego discloses a coated glass substrate wherein the coating comprises a heat absorbing layer which may comprise tungsten oxide. Gallego states that methods of depositing the heat absorbing layer are described for example in EP 523877 and EP 546669. EP 523877 discloses a plasma assisted CVD process and is irrelevant to the present invention of the same reasons as Tracey. EP 546669 is the Proscia reference discussed above.

18 Gallego thus effectively recites the teachings of Proscia. The allegation that the invention is obvious over Gallego in view of Tracey and Florczak is not justified for the reasons given above in relation to the rejection over Proscia in view of Tracey and Florczak.

19 USP 5385751 Riaz discloses a CVD process for the deposition of a fluorine doped tungsten oxide coating on the surface of a glass substrate. That substrate may be a glass ribbon produced during a float glass process. Riaz teaches the use of a tungsten alkoxide as the tungsten precursor. Proscia is a co inventor of this Riaz citation and this group has apparantly looked for volatile tungsten compounds other than the hexafluoride disclosed in Proscia and proposed the use of tungsten alkoxides in this citation. However from Example 1 of Riaz at column 3 line 63 it can be seen that these alkoxide precursors suffer from a tendency to pre reaction because Riaz arranges for them to be delivered in separate streams to the gas surface. The processes of this invention are differentiated from the disclosure of Riaz for the reasons discussed above in relation to Florczak.

20 The Examiner asserts that the claimed invention is obvious over Riaz in view of Tracey and Florczak. This assertion is not justified for the same reasons as set out in relation to the rejection over Proscia in view of Tracey and Florczak. Riaz does not teach the applicants precursor and the skilled man would not look to Tracey and Florczak for alternatives.

21 The Examiner comments on earlier submissions by the Applicants and states that in his opinion the skilled man would have a reasonable expectation of success for using the precursor of Tracey in the process of Proscia. Further that he would have the knowledge to use the CVD process of Tracey in place of the CVD process of Proscia. These comments are in my view based on an incomplete understanding of the invention.

22 Firstly as explained above in the float glass process a continuous glass ribbon is produced which is moving at speeds of 10 to 15 metres per minute. It is clearly impractical to coat the ribbon whilst it is at an elevated temperature under sub atmospheric pressure because of the difficulties of providing a seal on the moving surface of the ribbon.

Secondly the man skilled in the art of on line coating is searching for a precursor which can be volatilised in sufficient quantity, which is not thermally decomposed, which does not pre react significantly with the oxidant which is used and which then reacts quickly when brought into contact with the hot glass surface. He would regard Tracey as irrelevant to these considerations because Tracey does not address these factors. Tracey uses reactants which can be vapourised under low pressure and at low temperatures , Tracey has no issue with pre reaction because the process is carried out at low temperature and the reaction will be initiated by the plasma and he is not concerned with the deposition rate which he obtains because he can continue the process for as long as necessary.

23 The present invention provides an on line atmospheric pressure CVD deposition process which provides a significant advance over the known processes including those of Proscia, Riaz and Florczak The use of the novel combination of a tungsten chloride or tungsten oxyhalide with an oxidant which comprises an ester provides significant advantages which could not have been predicted on the basis of the secondary references including in particular Tracey.

24 I declare further that all statements made of my own knowledge are true and that all statements made on information of belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of the United States Code, and that such wilful false statements may jeopardise the validity of the application or any patent issuing thereon

Date 10th August 2005. Kevin D Sanderson

Kevin D. Sanderson